
Engineering guidelines

This module contains guidelines for ISDN-compatible software and hardware. This information includes the following:

- system compatibility
- configuration parameters
- data characteristics
- transmission characteristics
- loss and level plan
- call connection limitations
- software packages
- software/hardware compatibility
- hardware requirements
- ROM requirements
- cable information

System compatibility

The X11 Release 17 ISDN software supports the following system types:

- ST, NT, RT, and XT
- 21, 51, 61, and 71

The X11 Release 18 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 61, 71, and 81

The X11 Release 19 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 61, 61C, 71, and 81

The X11 Release 20 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 51C, 61, 61C, 71, and 81

The X11 Release 21 ISDN software supports the following system types:

- STE, NT, RT, and XT
- 21E, 51, 51C, 61, 61C, 71, 81 and 81C

The X11 Release 22 ISDN software supports the following system types:

- 51C, 61C, 81 and 81C

Configuration parameters

There are two types of configuration parameters:

- line rate
- T1 compatibility

The line rate is 1.544 Mbps.

The integrated voice and data can use a single medium to transmit speech and data between locations.

There are three advantages to T1 compatibility:

- T-link version 2 supports Meridian 1 to Meridian 1, Meridian 1 to SL-100, and Meridian 1 to Custom DMS-100 for 56 or 64 kbps data
- includes capability to be configured as a standard T1 DS-1 link
- eliminates need for channel bank equipment when using digital network facilities

Data characteristics

PRI utilizes Northern Telecom's T-link Data Rate Adaptation protocol. There are three transmission modes:

- asynchronous 50 bps to 19.2 kbps
- synchronous 1200 bps to 64 kbps
- half or full duplex

Transmission characteristics

There are five types of transmission necessary for ISDN compatibility:

- carrier system compatibility
- synchronization
- signaling
- trunk types supported
- voice transmission

These transmission types are described in the lists that follow.

Carrier system compatibility:

- compatible with D2, D3, D4, B8ZS, and Extended superframe format (ESF) framing on T1 repeater cables
- compatible with systems that use a DS-1 interface, such as fiber optics, microwave, copper, satellite, and infrared
- meets CCITT Q.921 and Q.931 recommendations
- complies with T1D1 minimal subset

Synchronization: stratum 3 compatible (accuracy, jitter, pull-in range)

Signaling:

- in PRI mode: ISDN D-channel signaling
- in DTI mode: loop start, ground start, E&M, DTMF, and dial pulse
- in ITA mode: PRI trunks use PRI mode and DTI trunks use DTI mode

Trunk types supported:

- CO, FX, WATS, DID, TIE (2-wire E&M, 4-wire E&M)

Voice transmission:

- meets EIA Digital PBX Draft Standard PN-1429 requirements such as loss and level, distortion, and delay

Note: ISDN meets the Radio Frequency Interference (RFI) requirements.

Loss and level plan

The loss plan for PRI has been added to the existing Meridian 1 loss matrix (the EIA loss plan).

Figure 14 shows the connections on a port-to-port basis and the corresponding loss values (in dB) for both directions of transmission.

Figure 14
PRI loss and level plan

Meridian 1 Ports		PRI Port	
Stations		↑	↓
	ONS →	4	
	←		7
	OPS →	0	
	←		3
	D/ONS →	0	
Analog Trunks	←		6
	I/ONS →	0	
	←		0
	A/TT →	0	
	←		3
Digital Trunks	S/ATT →	0	
	←		3
	A/CO →	0	
	←		3
	A/TO →	0	
	←		3
	D/TT →	0	
	←		0
	S/DTT →	0	
	←		3
	D/CO →	0	
	←		3/0
	D/TO →	0	
	←		0
	PRI →	0	
	←		0

Note 3

Note 4

553-1371

Note 1: The loss is bidirectional. For example, the A/TT coordinate indicates a nominal port-to-port loss of:
0 dB from the A/TT interface to the Primary Rate Interface (PRI)
3 dB loss from the Primary Rate Interface (PRI) to the A/TT interface

Note 2: The table column is shown; the loss table has a corresponding row.

Note 3: For echo control reasons, this connection cannot be loss-less.

Note 4: The value of 0 dB in the PRI-D/CO direction is the long-term objective. The value of 3 dB is to be used for connections to D/COs that have not been programmed for inserting receive-side loss on PRI to local loop connections.

Legend:

ONS	Line interface/on premise line
OPS	Line interface/off premise line
D/ONS	Digital line interface/on premise line
I/ONS	ISDN terminal (on premise)
A/TT	Analog trunk interface/analog TIE trunk
S/ATT	Analog trunk interface/analog satellite PBX TIE trunk
A/CO	Analog trunk interface/analog CO trunk
A/TO	Analog trunk interface/analog toll office trunk
D/TT	Digital trunk interface/digital or combination TIE trunk
S/DTT	Digital trunk interface/digital satellite PBX TIE trunk
D/CO	Digital trunk interface/digital or combination CO trunk
D/TO	Digital trunk interface/digital or combination toll office trunk
PRI	Primary Rate Interface

Call connection limitations

Call connection restrictions limit user access to networks and features by allowing users to set the following limits:

- number of tandem connections
- number of call redirections
- number of PSTNs; can be one or unlimited
- number of μ /A-law conversions
- number of satellite delays

These restrictions apply only within an ISDN environment. Limitations also prevent trunk lockup by allowing only one trunk without disconnect supervision to participate in a call connection. (Trunks providing disconnect supervision include CO/FX/WATS, CO, DID, TIE, CCSA, 2MB DTI trunks, and ISDN.) If multiple call transfers, conferences, or other situations cause two or more unsupervised trunks to be connected, call connection restrictions may not be effective.

Call connection restrictions override the Satellite Link Control feature. If the two features conflict (for example, Satellite Link Control limits satellite hops to one and call connection restrictions permit five hops), call connection restrictions prevail.

Prompts in LD 15 permit configuration of Call Connection Restrictions.

LD15—Call Connection Restriction Implementation

REQ	CHG	Change data.
TYPE	CDB NET_DATA	Customer Data Bloc. Networking Data (Release 21 gate opener).
CUST	0-99	Customer number.
ISDN	YES	ISDN option; must be set to YES to see following call connection restriction prompts.
...		
- RCNT	0-(1)-5	Number of call redirections allowed in a call connection.
- PSTN	YES/(NO)	YES limits the number of PSTNs allowed in a call connection to 1. NO permits unlimited PSTNs.
- - TNDM	0-(15)-31	Number of tandem connections allowed in a call connection.
- - PCMC	0-(15)-31	Number of PCM (μ /A-law) conversions permitted in a network connection.
- - SATD	0-(1)-5	Number of satellite delays allowed in a network connection.

Software packages

The following tables list the software features and their corresponding packages.

Note 1: To upgrade current ISDN software, see *Software conversion procedures* (553-2001-320).

Note 2: Package 19 is required for receiving CLID or NCPND.

Note 3: Package 75, PBX interface, is not required for ISL (package 147), unless ISL is over DTI. For ISL over analog trunks, ESN # 2 or 3 signaling is required. ESN # 5 signaling can be used if package 75 is installed.

Note 4: The QPC720C PRI card is required for DTI, with X11 Release 17 and later.

Note 5: CDP (package 59) requires packages 28 and 61. Packages 28 and 61 are not required for NARS (package 58).

Note 6: If the user dials a Location code, package 58 must be equipped at the originating and the receiving Meridian 1. If CDP is used, package 59 needs to be equipped at both sites.

Note 7: Package 117 is also required in ISA configurations.

Note 8: Multi-purpose Serial Data Link (MSDL) cards (NT6D80) require package 222 for D-channel (and Application Module Link) operations.

Table 17
Software packages (Part 1 of 3)

Features	Package dependencies
64 Kbps Clear Data Transport	75, 145, 146
Attendant Blocking of Directory Number (ABDN)	14, 28, 32, 58, 75, 127, 145, 146 or 147, 159
Attendant and Network Wide Remote Call Forward	1, 18, 58, 59, 73, 139, 145
Backup D-channel	75, 145, 146 or 147
Basic Call Service	75, 145, 146 or 147
Call Forward, Break-In, Hunt Internal or External Network Wide	159, 263
Call Page Network Wide	307
Call Park Network Wide	306, 159, 33
Calling Line Identification (CLID)	19, 75, 145, 146 or 147
CLID in CDR record	4, 5, or 6, 118, 75, 145, 146 or 147
AT&T 4ESS	75, 145, 146
Custom AT&T 5ESS	75, 145, 146, 149
Custom DMS100	75, 145, 146
Data Packet Network (DPN) access	75, 145, 146
Display of Calling Party Denied	95, 145, 159
DTI Backwards Compatibility	75
DTI with Extended Superframe (ESF)	75, 145, 146
E.164/ESN Numbering Plan Expansion	19, 57, 58, 145, 146, 147, 160, 203, 216, 222, 235, 263
ESN over ISL or Primary Rate Interface	14, 32, 37, 39, 58 or 59, 75, 145, 146
Integrated Services Access (ISA)	75, 117, 145, 146

Table 17
Software packages (Part 2 of 3)

Features	Package dependencies
Integrated Trunk Access (ITA)	75, 145, 146
ISDN CLID Enhancements	145
ISDN Signaling Link (ISL)	75, 145, 147
Local trunk queuing over PRI/ISL (offhook or call back queuing)	14, 28, 32, 37, 58 or 59, 62, 75, 145, 146 or 147
Meridian Mail Trunk Restriction	46
Multi-purpose Serial Data Link (MSDL)	222
NCOS over ISDN Signaling Link (ISL)	14, 32, 37, 39, 58 or 59, 75, 145, 147
NCOS over Primary Rate Interface to Custom DMS-100	14, 32, 37, 39, 58 or 59, 75, 145, 146
National ISDN-2 (NI-2)	145, 146, 222, 291
Network Attendant Service (NAS)	14, 28, 32, 58, 59, 61, 75, 127, 145, 146 or 147, 148, 159, 161, 192
Network Call Forwarding	14, 32, 58 or 59, 75, 145, 146 or 147
Network Call Party Name Display (NCPND)	19, 75, 95, 145, 146 or 147
Network Call Redirection (NCRD)	145, 146 or 147
Network Message Services (NMS)	14, 32, 58 or 59, 75, 77, 145, 146 or 147, 148, 175
Network Ring Again (NRAG)	14, 32, 58 or 59, 75, 145, 146 or 147, 148
Network Wide Listed Directory Numbers	14, 32, 58, 75, 76, 145, 146 or 147, 159
Non-Associated Signaling (nB +D)	75, 145, 146 or 147
PRI to DMS-250 or AT&T 4ESS	75, 145, 146, 149
Private Network Hopoff and Overflow	14, 28, 32, 58 or 59, 61, 75, 145, 146 or 147
QSIG Basic Call	263, 19, 145, 146, 222

Table 17
Software packages (Part 3 of 3)

Features	Package dependencies
QSIG Call Completion	263, 305, 316
QSIG GF Transport	263, 305
QSIG Name Display	19, 95, 139, 263, 305
Remote Virtual Queuing	192
T-1 Frame Slippage Auto-recovery	75, 145, 146
Trunk Anti-Tromboning	312, 145, 146 or 147, 148, 222
Trunk Optimization (TRO)	145, 146 or 147, 148
VNS VDN Expansion	14, 32, 58, 145, 146, 147, 148, 161, 183

Software and hardware compatibility

The different configurations within an ISDN environment are supported by different sets of features and services. As ISDN evolves, more and varied configurations are supported. These different configurations have their own software and hardware dependencies, as listed in the following tables.

The tables in this section describe the following configurations:

- Meridian 1 software and hardware compatibility
- Meridian 1 connectivity to SL-100, Custom DMS-100, and DMS-250, with software and hardware compatibility
- Meridian 1 connectivity to AT&T 4ESS and Custom AT&T 5ESS software and hardware compatibility
- Meridian 1 connectivity to National ISDN-2 (NI-2) software and hardware compatibility

Features in progressive Releases of X11 software are compared with the hardware introduced per Release—different versions of the QPC720 and the QPC757 cards. Remember that features are limited to the lowest software Release supporting a particular feature.

For example, a Meridian 1 with QPC757A supports software up to X11 Release 13 only. A node with QPC757C can support software up to X11 Release 15 — and calls between these two nodes are only supported by the lowest software version, X11 Release 13. Therefore, all nodes in the same network should support the same hardware and software.

Note: QPC720C is introduced in X11 Release 17. It is required for high-speed data calls (56K) between a Meridian 1 with a QPC472 using DTI to a Custom DMS-100 using PRI to a Meridian 1 with a QPC720.

Also, MSDL NT6D80 vintage AA supports Releases 18 - 20, inclusive. NT6D80 vintage AB supports Releases 21 and higher.

Conventions within the following tables are:

- LF = limited functionality (the two items do interact, but call functions are somewhat limited compared to a different configuration)
- N = no, or “not supported”
- - = not applicable, or it does not apply to this configuration
- NR = not recommended for this configuration
- R = X11 Release number
- Y = yes, it is supported

Table 18
Meridian 1 software and hardware compatibility (Part 1 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
Attendant Blocking of DN	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Attendant Netwide RCFW	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y
Att/Net RCFW	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	Y	Y	Y
Backup D-channel	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CFW, Break-In, Hunt Internal, External Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
CFW/Hunt Override FFC	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	N	Y	Y
Call Page Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	Y	Y	N	Y	Y
Call Park Netwide	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Call Pickup Network Wide	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
Calling Line ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calling Party Privacy	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	Y	N	N	N	Y	Y
CLID in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DCH Error Report and Monitoring	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y

Table 18
Meridian 1 software and hardware compatibility (Part 2 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
Display of Calling Party Denied	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
DTI Compatibility	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
Electronic Lock Net/Private Line	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
E.164/ESN Numb Plan Expansion	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
ESN over PRI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Incoming Trunk Program. CLID	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
ISDN CLID Enhancements	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
ISL*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
ISL (Conventional)*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
ITA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Meridian Mail Trunk Restriction	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
NACD	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
NAS	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
National ISDN 2 TR-1268 PRI	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
* Features must be compatible with the transport.																					

Table 18
Meridian 1 software and hardware compatibility (Part 3 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
nB + D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NCPND	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NND	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
NCRD																					Y
— NCFAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NCFB	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NCFNA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NHNT	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NWLDN	N	N	N	N	N	N	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NXFER	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Network Call Trace	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
Network Intercom	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
B8ZS	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NMS-MC	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NMS-MM	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NRAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
QSIG Basic Call	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG Call Completion	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG GF Transport	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
QSIG Name Display	N	N	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y

Table 18
Meridian 1 software and hardware compatibility (Part 4 of 4)

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
64 K Clear Data	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remote Virtual Queuing	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
Trunk Anti-Tromboning	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	Y
TRO	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
T1 Frame Slip Auto-recovery*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	-	-	N	N	-	-	-	Y*
T309 Timer	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Virtual Network Services	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
VNS VDN Expansion	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	N	N	N	N	Y	N	Y	Y
* Without the NTBK51AA.																					

Table 19
Meridian 1 compatibility with connectivity to SL-100, Custom DMS-100, DMS-250

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
Backup D-channel	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
nB+D	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	N	N	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Calling Line ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CLID in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DPN access	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
DTI Compatibility	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	Y
ESN over PRI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NND	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
NCRD																					Y
— NCFAC	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NCFB	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
— NCFNA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
— NHNT	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
NRAG (TIE)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
B8ZS	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
NRAG	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
64 K Clear Data	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Private Network Hopoff	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
T1 Frame Slip Auto-recovery*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	-	-	-	-	-	-	-	Y*
* Without the NTBK51AA.																					

Table 20
Meridian 1 software and hardware compatibility with connectivity to AT&T 4ESS

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
ANI in CDR	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ANI Station ID	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Backup D-channel	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA/CBC	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
DTI, ESF, CRC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-
nB+D	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y

Table 21**Meridian 1 software and hardware compatibility with connectivity to Custom AT&T 5ESS**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
ANI Station ID	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Basic Call Service	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISA/CBC	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N	Y	Y	Y	Y

Table 22**Meridian 1 software and hardware compatibility with NI-2**

Features	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C/E*	720F**	757A	757B	757C	757D	757E	NT6D80AA***	NT6D80AB***	NT5D12 DDP****
* The QPC720D was not introduced in North America (it is only used in Hong Kong.) ** The QPC720F has been introduced to handle NI-2, and R22 and higher software features. *** The NT6D80AA MSDL supports R18 - R20 inclusive. The NT6D80AB supports R21 and higher. **** Includes the NTBK51AA Downloadable D-Channel Daughterboard.																					
Bearer capability	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Basic Call Service	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Calling Party Number	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
nB+D	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y
Backup D-channel	N	N	N	N	N	N	N	Y	Y	N	N	N	Y	N	N	N	N	N	N	Y	Y

Table 23
Meridian 1 software and hardware compatibility

Services	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	720A	720B	720C	757A	757B	757C	757D	757E	MSDL
Release 13	Y	LF	LF	LF	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	LF	LF	LF	LF	N
Release 14	LF	Y	LF	LF	LF	LF	LF	LF	LF	LF	NR	Y	Y	N	LF	Y	Y	Y	N
Release 15	LF	LF	Y	LF	LF	LF	LF	LF	LF	LF	N	Y	Y	N	N	Y	Y	Y	N
Release 16	LF	LF	LF	Y	LF	LF	LF	LF	LF	LF	N	Y	Y	N	N	LF	Y	Y	N
Release 17	LF	LF	LF	LF	Y	LF	LF	LF	LF	LF	N	Y	Y	N	N	N	LF	Y	N
Release 18	LF	LF	LF	LF	LF	Y	LF	LF	LF	LF	N	N	Y	N	N	N	N	Y	Y
Release 19	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 20	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 21	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
Release 22	LF	LF	LF	LF	LF	LF	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y
QPC720A	Y	NR	N	N	N	N	N	N	N	N	Y	LF	LF	Y	Y	LF	LF	LF	N
QPC720B	Y	Y	Y	Y	Y	N	N	N	N	N	LF	Y	LF	N	LF	Y	Y	Y	N
QPC720C/E	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
QPC720F	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
QPC757A	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Y	LF	LF	LF	LF	LF
QPC757B	LF	LF	N	N	N	N	N	N	N	N	Y	LF	LF	LF	Y	LF	LF	LF	LF
QPC757C	LF	Y	Y	LF	N	N	N	N	N	N	LF	Y	Y	LF	LF	Y	LF	LF	LF
QPC757D	LF	Y	Y	Y	LF	N	N	N	N	N	LF	Y	Y	LF	LF	LF	Y	LF	LF
QPC757E	LF	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	Y	Y	LF	LF	LF	LF	Y	LF
NT6D80 (MSDL)	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	N	N	N	Y	Y	Y
NT5D12/w NTBK51AA	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	LF	LF	Y	N	LF	Y	Y	Y	Y
Y = (supported); N=not supported; NR=not recommended; LF=limited functionality (items interact, but call functions could be limited)																			

Meridian 1 connectivity

X11 Release 17 and later software supports ISDN signaling between Meridian 1 and the following products:

- Meridian 1
- SL-100
- Custom DMS-100 and DMS-250
- AT&T 4ESS
- Custom AT&T 5ESS

General networking capabilities available with X11 Release 17

- Basic Call Service
- Calling Line Identification
- Calling Line Identification in Call Detail Recording (CDR) Record
- DTI Backwards Compatibility
- Trunk Route Optimization (before answer)

General networking capabilities available with X11 Release 18

- Remote Virtual Queuing

General networking capabilities available with X11 Release 20

- Network Attendant Services
- Attendant Network Remote Call Forward
- Network Listed Directory Number

General networking capabilities available with X11 Release 21

- Attendant Blocking of DN
- Calling Party Privacy
- Call Forward/Hunt Override via FFC
- Call Pickup Network Wide
- Electronic Lock Network Wide/Private Lines
- Incoming Trunk Programmable CLID

- National ISDN-2 (NI-2) TR-1268 PRI
- Network Intercom
- Display of Calling Party Denied
- Trunk Anti-Tromboning
- Virtual Network Services

General networking capabilities available with X11 Release 22

- Automatic Redial
- Call Forward, Break-In and Hunt Internal or External Network Wide
- Call Page Network Wide
- Call Park Network Wide
- E.164/ESN Numbering Plan Expansion
- ISDN CLID Enhancements
- QSIG Basic Call
- QSIG Call Completion
- QSIG General Function Transport
- QSIG Name Display
- Meridian Mail Trunk Access Restriction
- Trunk to Trunk Connection
- Virtual Network Services Directory Number Expansion

Hardware requirements

The following hardware is required for ISDN:

- QPC720C Primary Rate Interface card (up to and including Release 20)

OR

- QPC720C Primary Rate Interface card for 64 (for NI-2 and from Release 21 and higher)

OR

- NT5D12 DDP, that requires the following:

- one NT6D80 MSDL

or optionally, as a plug-on

- one NTB51AA Downloadable D-Channel daughterboard

or optionally, an external DCHI card

- one QPC757 DCHI

- QPC757xx, or NT6D11xx D-channel Interface (one per 16 PRIs)

OR

- Multi-purpose Serial Data Link (MSDL) - NT6D80AA (Release 18 - 20 inclusive), NT6D80AB supported on X11 Release 21 and higher)

- QPC471 (vintage B or higher is recommended) or QPC775 Clock Controller (one per CPU)

- QPC471 vintage H or later is required for option 81 systems

- QPC414B Network Card (one loop per PRI)

Note 1: For PRI, the QPC720x, QPC757x (or NT6D80xx), and QPC471 (or QPC775) cards are all required. For every destination, an independent D-channel is also needed, one for every 16 PRIs to the same destination.

Note 2: The QPC471 and QPC775 Clock Controller cards cannot be intermixed in one system.

Note 3: For every destination, an individual D-channel is required.

- Channel Service Unit (CSU): U.S.A. regulations (FCC Part 68) require Network Channel Terminating Equipment (NCTE) at the demarcation point to registered common carrier trunks. Use Digilink, Verilink, or similar CSUs (one per PRI).
- For data calls using satellite transmission, the MCA, MCU, and HSDM provide echo cancellation capabilities.
- Packet Assembler/Disassembler (PAD): for DPN capability, an X.25 Meridian 1 compatible PAD is required.
- Test equipment: use a Thor Error Counter, or the equivalent, to test bipolar violations on PRI circuits.
- 2400-baud modem with auto dial capability: can be used for ISL in dedicated mode. The recommended modem is the Hayes Smartmodem 2400. See *ISDN Primary Rate Interface installation* (553-2901-200) for information about how to configure the Hayes Smartmodem 2400.
- QMT11 Asynchronous/Synchronous Interface Module (ASIM) can be used for ISL in dedicated mode. This module has leased line capability.
- QMT21 High Speed Data Module (HSDM), Meridian Communications Adapter (MCA), or Meridian Communications Unit (MCU) must be used for 64K clear transmission (available between Meridian 1 systems). This also applies to the DMS-250 and the SL-100 using their data units.
- QPC237 4W TIE E&M Trunk can be used to support ISL uniform trunk hardware configuration.

Tables 24 and 25 show current system hardware requirements.

Table 24
System D-channel hardware requirements with a single D-channel

System parameters	QPC757	NT6D11xx	
		Single port	Dual port
Maximum cards per system	8	15	8
Maximum D-channels per system	8	15	8
Maximum asynch ports	8	15	8
Maximum PRI channels to each destination, by each D-channel port	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI	23 with 1 PRI 47 with 2 PRI . . . 359 with 15 PRI
Maximum B-channels per system	2872	5385	2872

Table 25
System hardware requirements with a backup D-channel

System parameters	QPC757	NT6D11xx	
		Single port	Dual port
Maximum cards per system	8	16	8
Maximum DCHI	8	14	8
Maximum asynch ports	8	14	8
Maximum PRI channels to each destination, by each D-channel port	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI	23 with 1 PRI 46 with 2 PRI . . . 382 with 16 PRI
Maximum B-channels	1528	2674	1528

ROM requirements

Table 26 shows current ROM and memory card requirements.

Table 26
ROM and memory card requirements

X11 Release	Card type	ST, 21	STE and 21E	RT	NT, 51, 61	XT, 71	51C, 61C, 81C
14	Memory	QPC673 or QPC814	N/A	QPC583	QPC583	QPC583	N/A
	ROM	QPC717D or QPC937	N/A	QPC602	QPC602	QPC602	N/A
15,16,17	Memory	QPC814	N/A	QPC583A	QPC583	QPC583	N/A
	ROM	QPC940	N/A	QPC939A	QPC939	QPC939	N/A
18,19,20, 21	Memory	N/A	NTND01	NTND09	NTND09	NTND09	Note
	ROM	N/A	NTND31	NTND08	NTND08	NTND08	Note
Note 1: ROM and memory requirements for the option 81, X11 Release 18 and later, option 61C, X11 Release 19 and later, and option 51C, X11 Release 20 and later, are fulfilled with the NT6D66 Call Processor (CP) card. Note 2: Release 20 requires increased memory for some systems. All option 51C, 61C, and 81 required a 48MB CP card. Refer to <i>Software conversion procedures</i> (553-2001-320) for details.							

Cable information

The following lists contain cable and channel information. The cable type used is a 2-pair twisted wire.

Cable distance (see Figure 15):

- 655 ft (200 m) Meridian 1 to DSX-1 cross-connect point (using ARAM or ABAM equivalent shielded cable)
- 750 ft (229 m) from Meridian 1 to Office Repeater Bay

Specific cables are detailed in *ISDN Primary Rate Interface installation* (553-2901-200).

Figure 15
Cable distance to DSX-1 and office repeater bay

